FIG.1

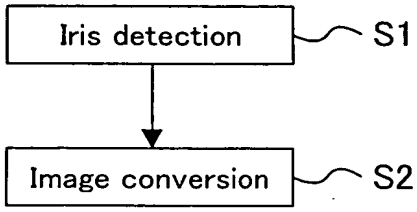

Iris detection
S1
Image conversion
S2

FIG.2

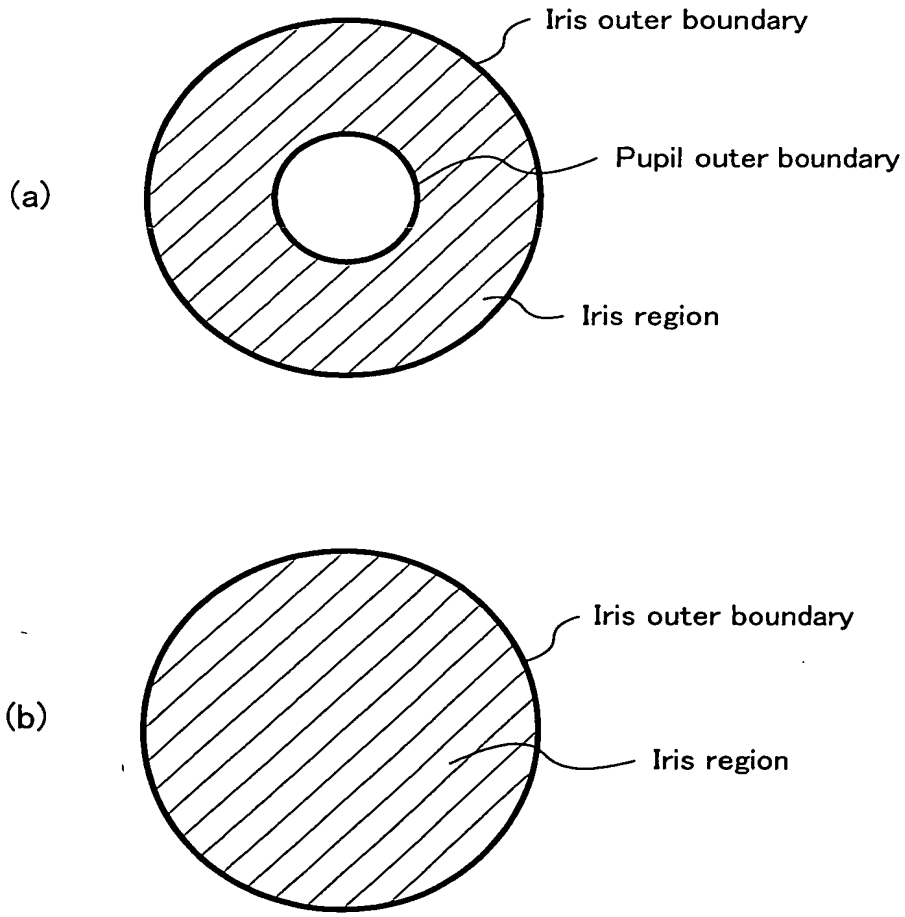

(a)
Iris outer boundary
Pupil outer boundary
Iris region
(b)
Iris outer boundary
Iris region

FIG.3

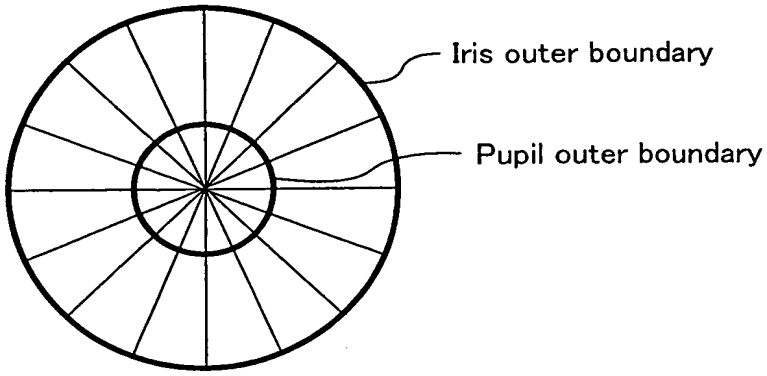
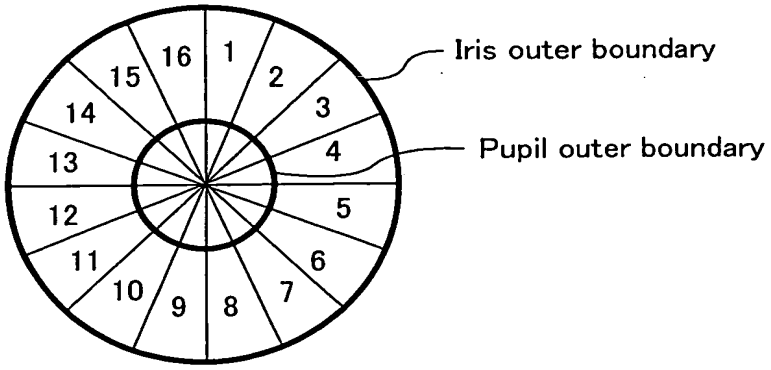


FIG.4

(a) Original iris image



(b) After re-arrangement

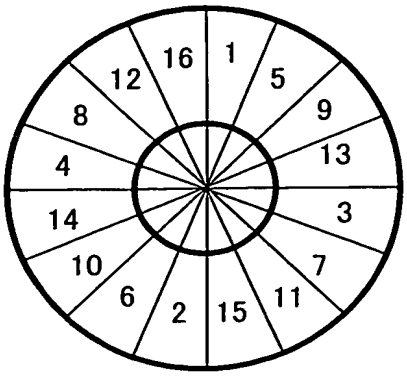


FIG.5

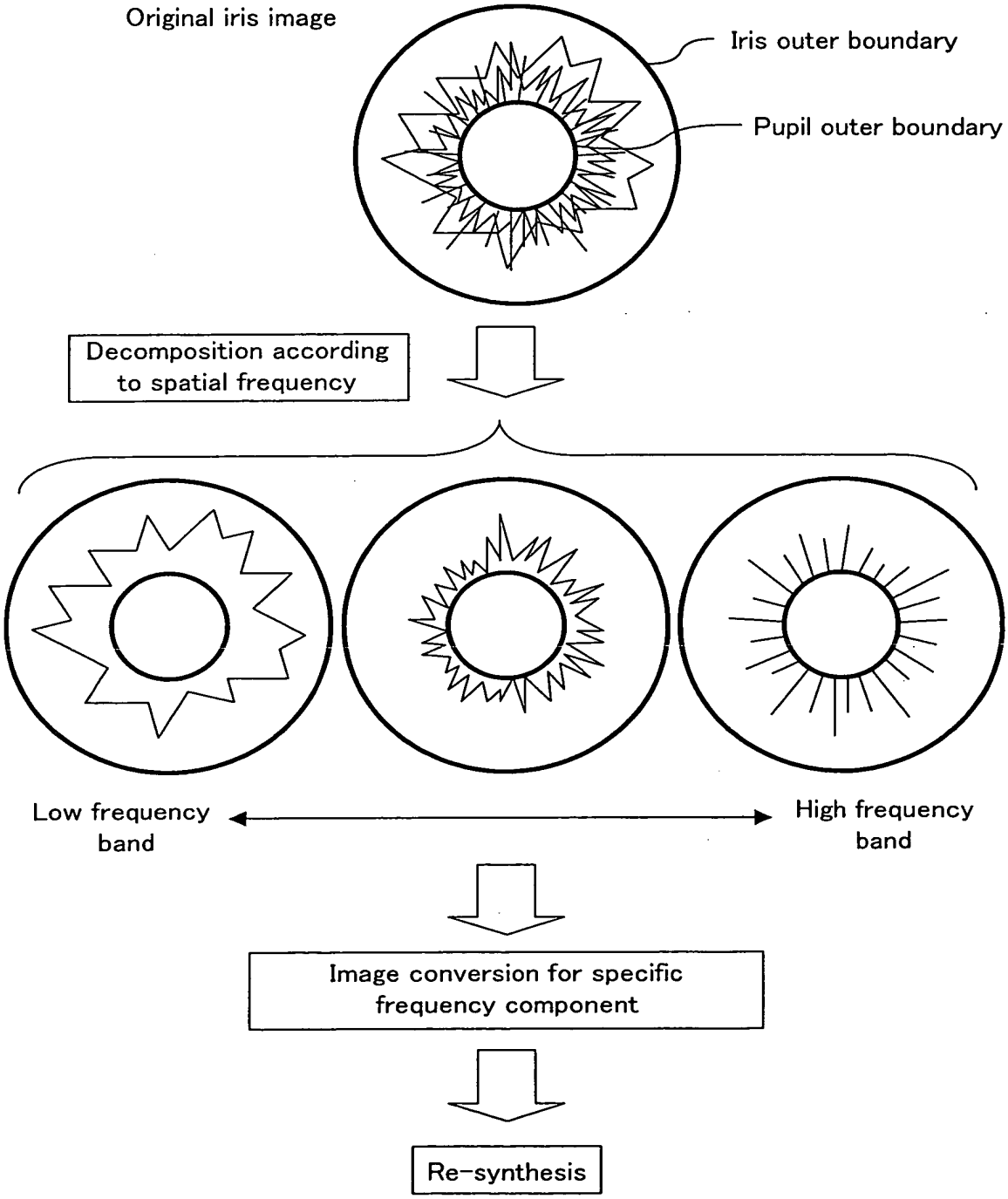

Original iris image
Iris outer boundary
Pupil outer boundary
Decomposition according to spatial frequency
Low frequency band
High frequency band
Image conversion for specific frequency component
Re-synthesis

FIG.6

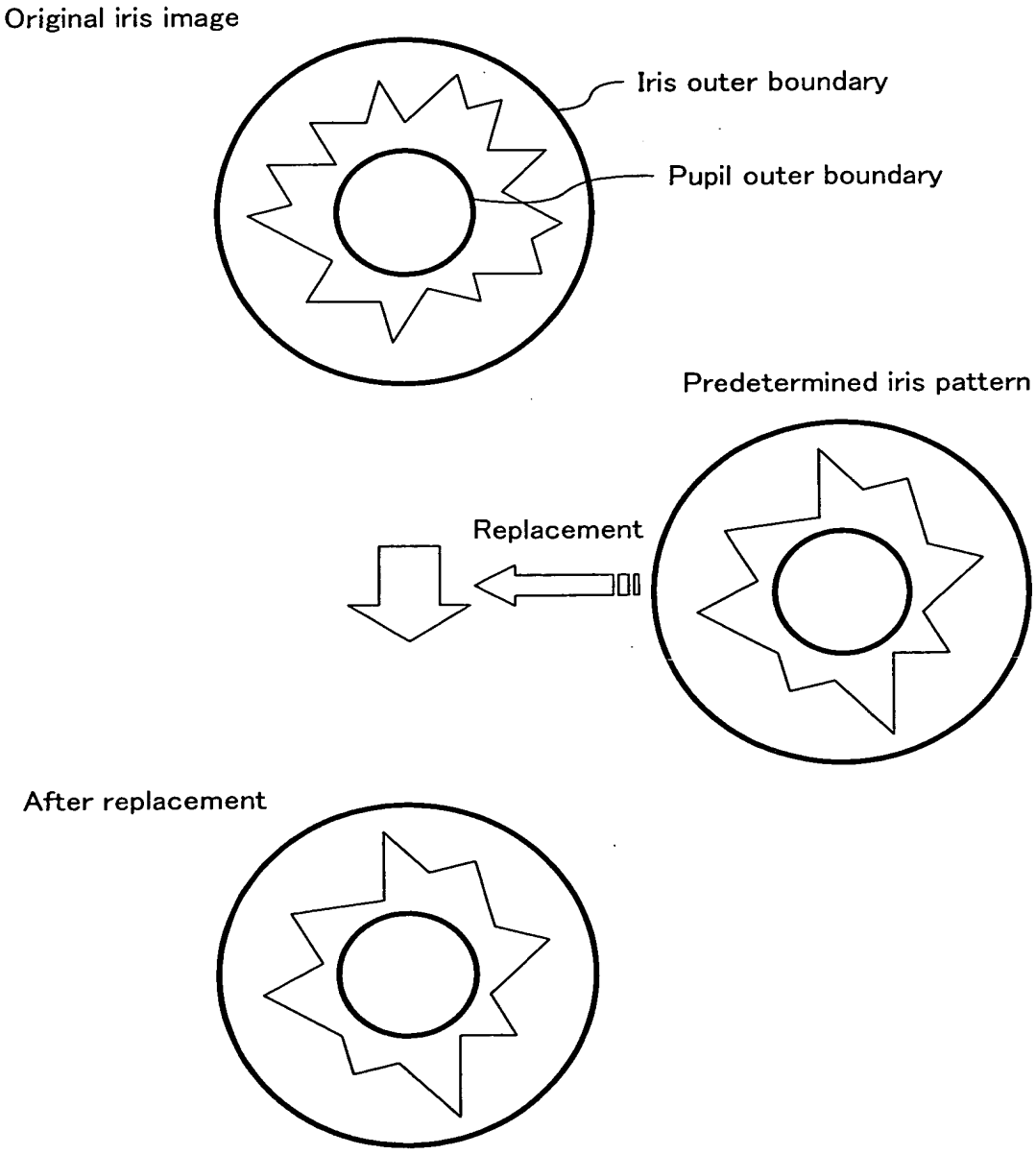

Original iris image
Iris outer boundary
Pupil outer boundary
Predetermined iris pattern
Replacement
After replacement

FIG.7

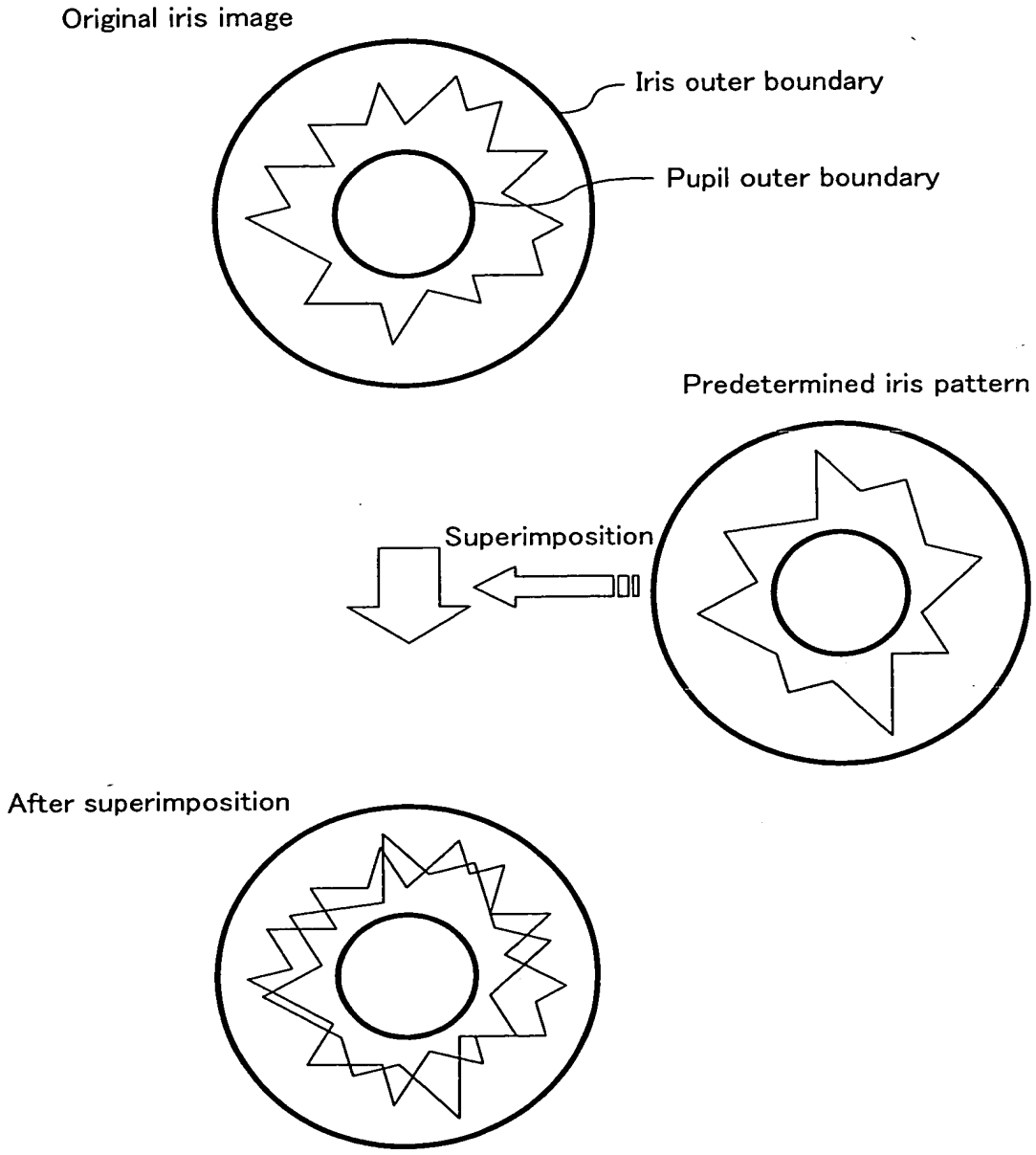

Original iris image
Iris outer boundary
Pupil outer boundary
Predetermined iris pattern
Superimposition
After superimposition

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FIG.8

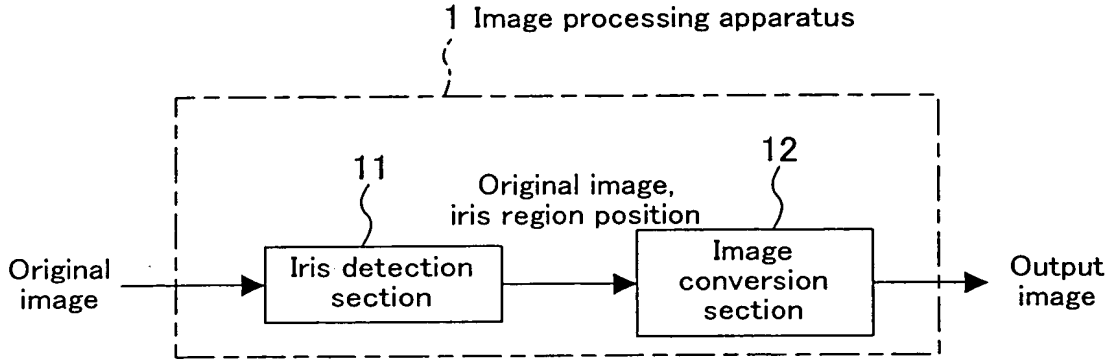


FIG.9

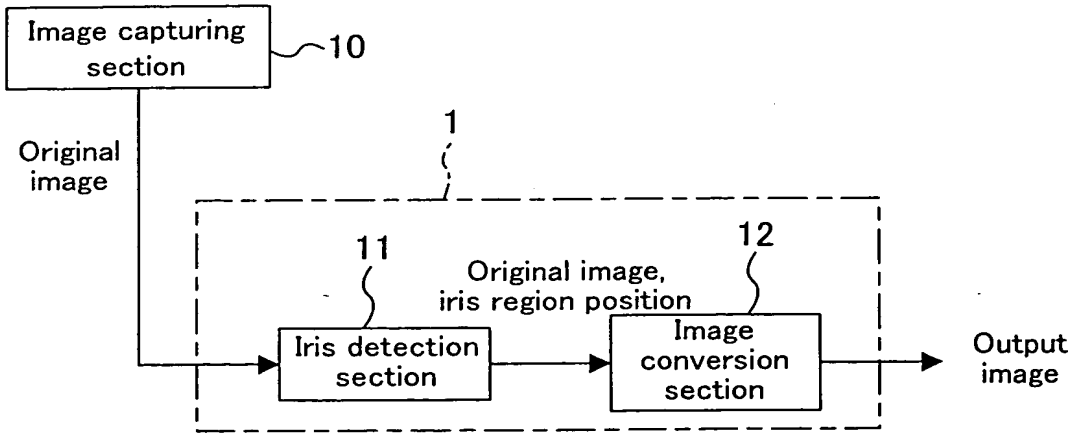


FIG.10

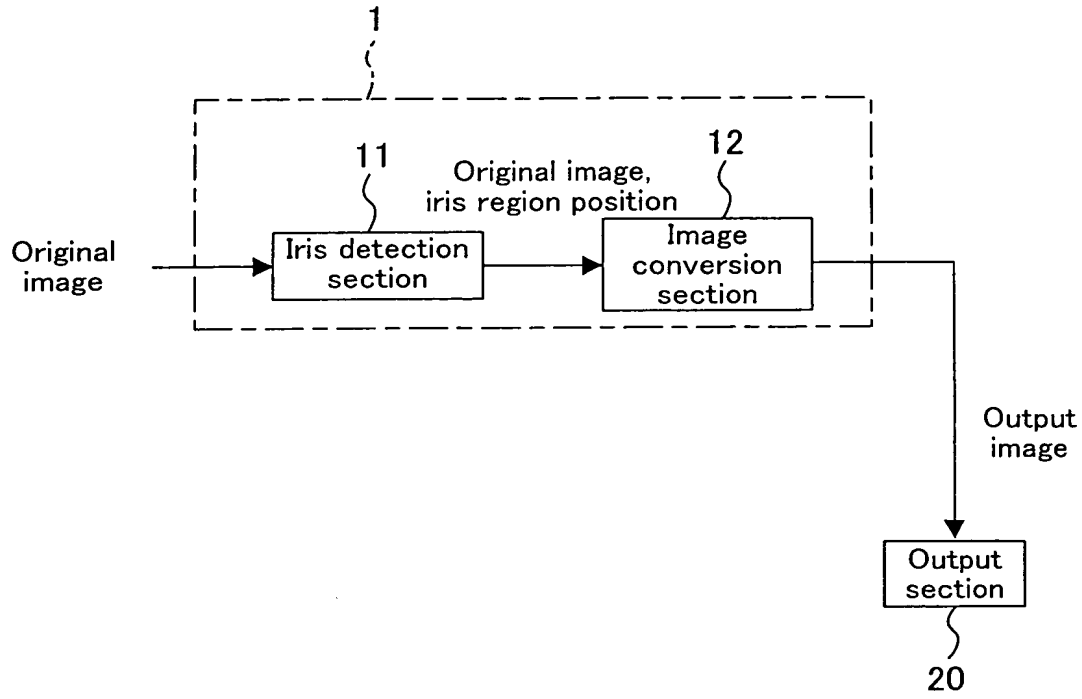

1
11
12
Original image,
iris region position
Original
image
Iris detection
section
Image
conversion
section
Output
image
Output
section
20

FIG.11

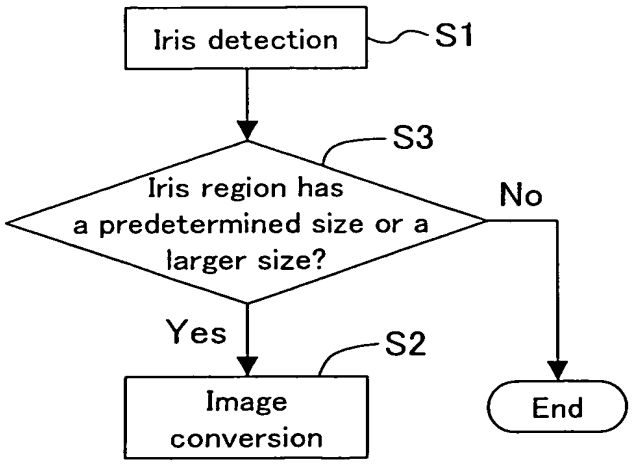
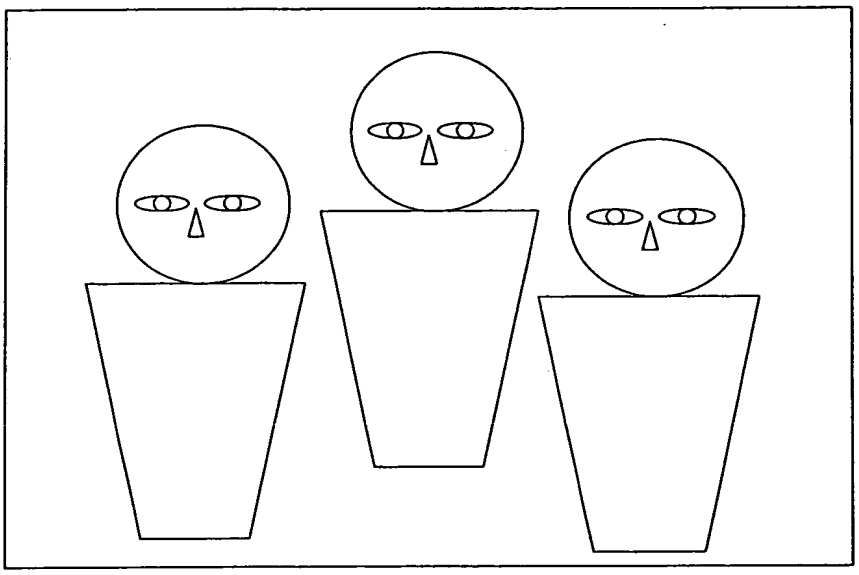

Iris detection
S1
S3
Iris region has
a predetermined size or a
larger size?
No
Yes
S2
Image
conversion
End

FIG.12

(a) No image conversion performed



(b) Image conversion performed

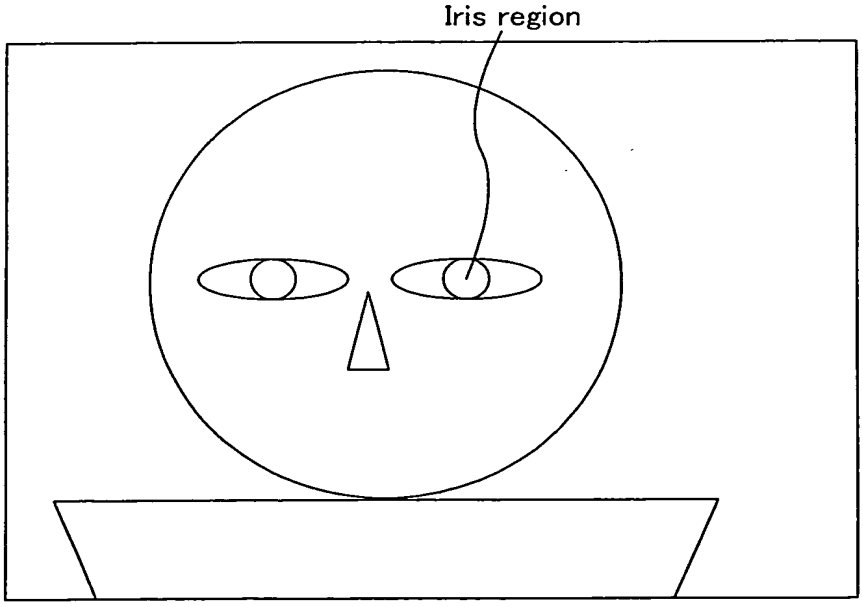


FIG.13

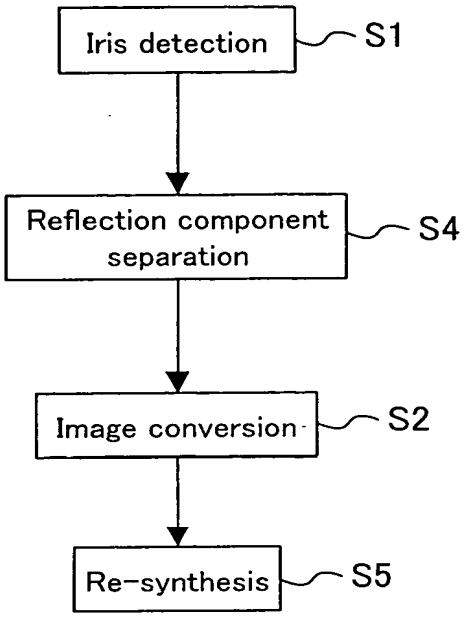

Iris detection
S1
Reflection component separation
S4
Image conversion
S2
Re-synthesis
S5

FIG.14

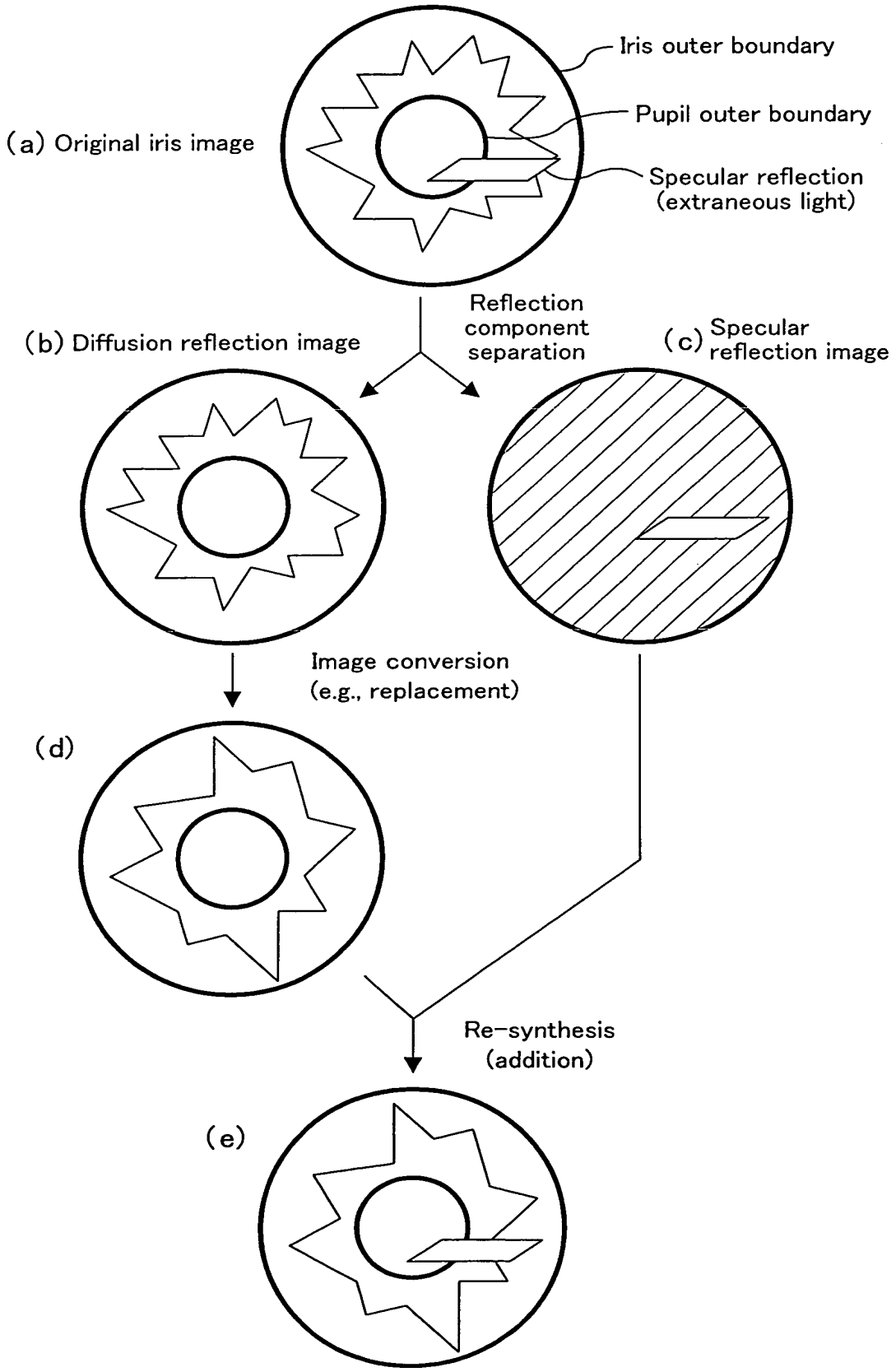
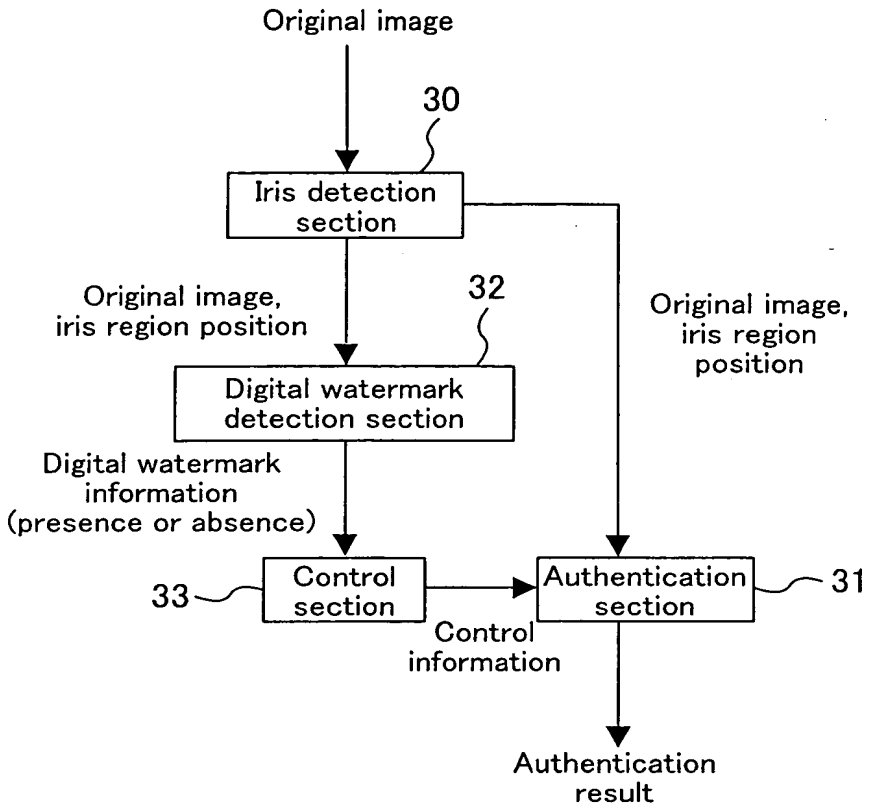

(a) Original iris image
Iris outer boundary
Pupil outer boundary
Specular reflection (extraneous light)
Reflection component separation
(b) Diffusion reflection image
(c) Specular reflection image
Image conversion (e.g., replacement)
(d)
Re-synthesis (addition)
(e)

FIG.15


Original image
30
Iris detection section
Original image, iris region position
32
Digital watermark detection section
Digital watermark information (presence or absence)
Original image, iris region position
33
Control section
Authentication section
31
Control information
Authentication result